

**IN THE CLAIMS:**

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims 1-8, 10, and 11-15, in accordance with the following:

1. (CURRENTLY AMENDED) An optical amplifier, comprising:  
an input power detecting unit that detects an input power of an optical signal;  
an output power detecting unit that detects an output power of the optical signal;  
an optical amplifying unit that amplifies the optical signal;  
a change factor detecting unit that detects a factor that causes a gain of the optical amplifying unit to change; and  
a control unit that provides a control, based on the input power, the output power, and the factor, so that the gain of the optical amplifying unit is a predetermined value.
2. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon the input power of the optical signal, and  
the control unit uses a result of addition of the value of the factor and the input power to provide the control.
3. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon a temperature of the optical amplifying unit, and  
the control unit uses a result of addition of the value of the factor and the input power to provide the control.
4. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon both the input power of the optical signal and a temperature of the optical amplifying unit, and  
the control unit uses a result of addition of the value of the factor and the input power to provide the control.

5. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon the output power of the optical signal, and  
the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

6. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon a temperature of the optical amplifying unit, and  
the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

7. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the change factor detecting unit detects a value of a factor that depends upon both the output power of the optical signal and a temperature of the optical amplifying unit, and  
the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

8. (CURRENTLY AMENDED) The optical amplifier according to claim 1, wherein:  
the optical amplifying unit includes an excitation laser diode, and  
the control unit controls the excitation laser diode to provide the control.

9. (ORIGINAL) A control method for an optical amplifier, comprising:  
detecting an input power of an optical signal;  
detecting an output power of the optical signal;  
amplifying the optical signal;  
detecting a factor that causes a gain of the optical amplifying unit to change; and  
providing a control, based on the input power, the output power, and the factor, so that the gain of the optical amplifying unit becomes constant.

10. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon the input power of the optical signal, and

the providing the control includes using a result of addition of the value of the factor and the input power to provide the control.

11. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon a temperature of an optical amplifying unit that amplifies the optical signal, and

the providing the control includes using a result of addition of the value of the factor and the input power to provide the control.

12. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon the input power of the optical signal and a temperature of an optical amplifying unit that amplifies the optical signal, and

the providing the control includes using a result of addition of the value of the factor and the input power to provide the control.

13. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon the output power of the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor from the output power to provide the control.

14. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon a temperature of an optical amplifying unit that amplifies the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor from the output power to provide the control.

15. (CURRENTLY AMENDED) The control method according to claim 9, wherein:  
the detecting the factor includes detecting a value of a factor that depends upon the  
output power of the optical signal and a temperature of an optical amplifying unit that amplifies  
the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor  
from the output power to provide the control.

16. (ORIGINAL) The control method according to claim 9, wherein the providing  
control includes controlling an excitation laser diode in an optical amplifying unit that amplifies  
the optical signal.